Database Migration – Case Study

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**Project**
Split 55 application’s databases in geographically apart multiple data centers of acquired company, copy/move databases (approximately 20 TB) and setup new databases with split data into a spin-off data center for acquiring company. Create a new Disaster Recovery site with DR databases for acquiring company.

**About Client**
It is a global leader in delivering innovative communications, information and entertainment. They offer voice, data and video products and services over intelligent wireless, broadband and global IP networks that meet customers' growing demand for speed, mobility, security and control. (Reference and details provided on demand)

**Client’s Problem**
Client decided to sell some part of its business. For this purpose, they had to setup a new data center (spin-off) for acquiring company and move related business/IT data from their multiple data centers to spin-off data center. Moreover, they had to reverse migrate some of the applications and its database that were running at proposed spin-off data center and that were not being part of sale.

**Business Requirements**
At business level, following were the broad requirement provided to us:

- Forward Migration of 55 business critical, mission critical, and system critical applications from all other data center to spin-off data center
- Reverse Migration of 10 business critical, mission critical, and system critical applications from spin-off data center to other data center
- Setup Disaster Recovery (DR) databases
- Production Support during proving period after cut-over
- Transition to new production support team after sale is final

Application/Server setup and migration was performed by other team.

**IT Requirements**
Following were the identified IT Requirements provided to us for each of the 65 identified applications awarded to our team:

1. Estimate infrastructure requirements for databases and provide the same to procurement
2. Coordinate with stakeholders, such as, Network Administration/Engineering, Provisioning, Storage, System Administration, DB Engineering, Security to setup hardware and software infrastructure for the databases
3. Setup databases (Oracle, SQL Server, DB2, Informix) in multiple data centers including spin-off data center
4. Split existing databases in multiple data centers.
5. Forward Migrate split data/database (selling business) to spin-off data center
6. Reverse Migrate databases not part of sale
7. Setup DR databases
8. No downtime outside of maintenance window
9. Existing application and workflow handles migrated data
10. No change in data structure and application logic

Application/Server setup and migration was performed by other team.

Our Challenges
1. Precise estimation of infrastructure hardware requirements, software licensing requirement and getting them approved.
2. Unfamiliarity of client’s eco-system.
3. Every application database was different in size, nature, setup, functionality etc. So we had to come up with right approach for each application.

4. Potential risk of application database shifting from spin-off group to non-sale group and vice versa. In such case, everything from design to implementation changes.

5. Handling transfer of large size database from DC to DC as there was potential of low bandwidth availability on the cut-over days/ nights because of simultaneous high volume transfer on those very days/nights by other teams too.


7. DBA resource rotation.

8. No downtime outside of maintenance window permitted.

9. Lack of application knowledge.

10. No proven approach available with the client.

11. Smooth transition of production support responsibility to other team after sale.

**Database Setup Strategies Evaluated**

**Forward Migration**

**Strategy-1: Copy/Delete**

1. Copy entire database from source data center to spin-off data center
2. Delete retained business data from database in spin-off data center using CTAS methodology

**Strategy-2: Extract/Transfer/Load (ETL)**

1. Create blank database in spin-off data center with same setup as there in source
2. Extract business on-sale data from database in source data center
3. Transfer extracted data to the database box in spin-off data center
4. Load transferred data into database in spin-off data center

**Reverse Migration Strategy**

Forward migration strategies were also applied to the databases falling in reverse migration category.

**DR Setup Strategy**

**Strategy-1: On-line Replication**

1. Create database at DR Site in the same as database at spin-off data center
2. Setup one way on-line replication (from spin-off to DR site)

**Strategy-2: Standby database at DR Site**

1. Create database at DR Site in the same as database at spin-off data center
2. Setup this database as standby and that will sync-up every hour
Strategy-3: Snap-Mirror

1. Setup snap mirror of production database in spin-off data center at DR site. This synchronizes data files every 24 hours and log files every 30 minutes.

Database Migration Executed

We adopted both the strategies for forward migration depending upon type of application, size of database, ratio of size of business on-sale data to the whole database size.

We finished reverse migration in the last second month. We created 25-days implementation plan for forward migration that we executed in last month until cutover. First we started copying critical application databases and large sized databases to the boxes in spin-off data center. Because of good available bandwidth, we were able to match data transfer with the data growth. All application databases falling in Extract/Transfer/Load category, we scheduled for during last leg. This approach helped us minimize cut-over day/night work load.

We had setup DR using above indicated three strategies depending upon application need and available licenses.

After cutover, proving period started and the team moved from project mode to production support mode. During proving period we worked on fall outs, data delete where required, database tuning, regular production support, and knowledge transfer to new production support team of Spin-off Company.

We had setup data synchronization between two production databases and one DR database using Shareplex 3-way replication for ordering applications to eliminate data loss and thereby business loss in case of unexpected event.

Final Outcome

Client’s requirement fulfilled and project delivered successfully.

Lessons Learned

The key lessons learned were:

1. Ability to research and ability to take calculated risk is key to success of such highly technology centric projects.
2. Involvement in project from the day one was helpful in ironing human and information related issues.
3. It is important to think outside the box and explore better way of doing the same thing.
4. Rigorous as-is database analysis paid off.
5. A good implementation plan and a close coordination with stakeholders especially during cutover month paid off.
6. Involvement of DBAs and Database Architects of client in decision making saved considerable
time and enhanced quality.
7. Reference to past experiences of similar projects is an important ingredient to ensure mistakes
in those projects are not repeated.
8. If everyone involved (IT and business stakeholders) works together with a clear aim in mind
anything can be done.
9. More proactive firewall management would have helped avoid outage when a database was not
able to connect to other database as per application requirement.

References
References will be provided on-demand.

About Author
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